JDSF Newsletter
Jackson Demonstration State Forest
State of California Dept. of Forestry P.O. Box 1185 Fort Bragg, CA. 95437

No. 13 February 1984

SKID TRAIL TILLING TRIAL CONDUCTED

Thom Sutfin[1/] and Peter Cafferata[2/]

As noted in the previous JDSF Newsletter, the James Creek 1983 Timber Sale (JC '83) includes a study designed to evaluate the effectiveness of tilling skid trails and landings to: 1) improve planted seedling survival and growth, and 2) reduce soil erosion. While soil tillage has reduced soil compaction following logging over a range of soil types and site conditions in the Pacific Northwest and the South, it has received limited use in the redwood region.

Based on guidelines developed at Oregon State University (Andrus and Froehlich, 1983), skid trails on JC '83 are to be tilled to at least 18 inches in depth using a D-6 Caterpillar crawler tractor (or equivalent) equipped with a five-tine ripper with tine spacing of no more than 24 inches. The crawler tractor will make one pass along each skid trail. Andrus and Froehlich (1983) indicate that adding wings to the sides of each tine significantly increases the amount of soil loosening. Due to lack of commercial availability and added costs, however, winged tines will not be used for this study. To prepare for the full-scale operation next summer (1984), a tilling trial was conducted on a site similar to the study area. This trial was useful in determining possible problems and means of solving them. The following is a description of the day's activities.

The majority of the skid trails entering a major landing in the southern portion of the JC '82 timber sale were tilled with a five-tine ripper attached to a Caterpillar D-6C crawler tractor. Both primary (ridge) trails and secondary (lateral) trails were tilled with varying techniques. Three cross-section plots were established to estimate the percentage of the trail undergoing tillage.

Generally, the operator drove the tractor to the top of the ridge and ripped downhill to the first lateral trail. At this point, he backed out to the end of the trail and ripped to the primary skid road. This procedure was followed until the entire herringbone trail system was ripped. While no time study was done, it was estimated that the ripping operation took no longer than normal waterbarring of skid trails.

The first ripping technique tried was to have all five tines till straight down a trail. This method produced varying degrees of success. Immediately it was obvious that organic debris, both on the surface and buried below, caused tillage to be severely restricted. The tines were 24 inches in length, and as mentioned above, tillage was to be a minimum of 18 inches in depth. Organic material often restricted ripping to the surface 10 inches. Therefore, the operator was forced to lift the tines more frequently

1/ Forester I, Jackson Demonstration State Forest, Fort Bragg, CA 95437.
2/ Junior Forester/Hydrologist, Resource Management, Mendocino Ranger Unit, Ukiah CA 95482

than anticipated to remove the collected material. Although this varied throughout the ripping unit, often this required stopping every 25 feet. Similar problems were found in the Oregon State University study.

Another problem which had not been anticipated was excessive soil moisture. At least two inches of rain fell during the week prior to ripping, and in a few scattered areas the soil profile was quite moist. Ideally, tillage should be attempted during the driest time of the year, so that the compacted soil will shatter upon impact and break into small clods. In several locations, the tines simply carved trenches and failed to break up the compacted soil to any degree. This problem can be attributed to both excess soil moisture and tine geometry.

Following approximately two hours of ripping with five tines, two were removed and the spacing changed from 20 inches to 40 inches between tines. This was primarily done to reduce the "organic material" collected in the tines and the frequency needed to clean them. It quickly became apparent that this spacing was insufficient to shatter the compacted layer across the whole skid trail. Excavation showed that at least seventy-five percent of the trail was unaffected when ripped in this manner. It was effective, however, in reducing the organic debris collection in the tines.

In an effort to more completely till the whole skid trail, the operator was next instructed to move down the road in a zigzagging fashion. It was thought that the twisting and turning movements with the tines would produce a more evenly churned surface. Even though it was apparent that this action improved the overall effectiveness of the ripping, it was still clear that three tines going 18 inches deep simply were not sufficient for complete trail tillage.

Finally, the two removed tines were replaced on the ripping unit and the operator was instructed to continue tilling with the zigzag technique. This method produced the most satisfactory results of all those tested on this site. To facilitate ripping in this manner, the operator was forced to lift the ripping unit when turning to start a new stretch of trail. This procedure was done frequently, since the crawler tractor was moving from one side of the trail to the other as often as was possible. In effect, this quick lifting motion generally freed the tines of organic debris and allowed their full penetration in the compacted soil profile. The constant twisting and churning of the tines often produced large clods over the trail surface and effectively shattered the compacted layer. This method did, however, require some practice by the operator before it was performed at peak efficiency.

The three plots established to estimate the percentage of the trails being ripped were all tilled with five tines moving in a straight (non-zigzag) pattern. It was determined that this method fractured approximately 48 percent of the top 15 inches of soil along a 10-foot wide path. Although no measurements were taken, it was clear that the zigzag tilling technique increased the amount of soil fractured by creating a somewhat wider path and by more thoroughly disturbing the soil with its turning movements.

REFERENCE:

Andrus, C. W., and H. A. Froehlich. 1983. An evaluation of four implements used to till compacted forest soils in the Pacific Northwest. Forest Research Laboratory, Oregon State University, Corvallis. Research Bulletin 45. 12 p.

Special thanks to Berglund Tractor Company of Napa, California, for use of their Caterpillar D-6C crawler tractor on this project.

* * * * * *

IS THE "HAMILTON E-Z BRIDGE" E-Z?

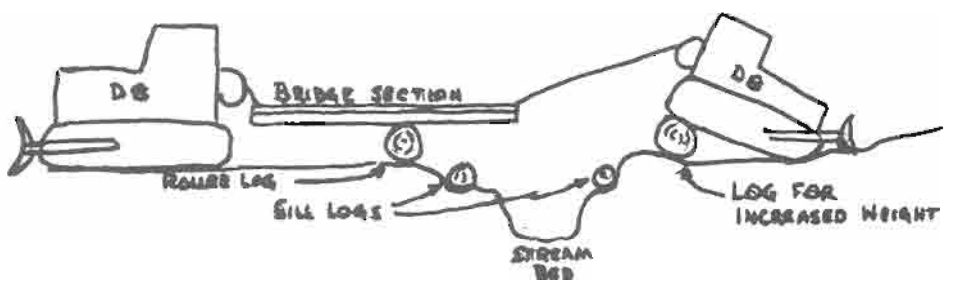
Glen Pinoli[1/]

As part of the State Forest's never-ceasing and ever-increasing effort to conduct demonstration and experimentation projects with timber harvesting operations, the James Creek 1982 Timber Sale required the contractor to purchase and install a single-lane, 20-foot mininum length, "Hamilton E-Z bridge" or equivalent at a determined location on the main branch of James Creek.

Manufactured in Springfield, Oregon, the Hamilton E-Z bridge was trucked to Willits, where it was transferred to a lumber truck and hauled the remaining 15 miles to the installation site. The bridge, which arrived in two sections, was unloaded using a standard front-end loader. The logging subcontractor, Bozarth Logging, Inc., of Ukiah, performed the bridge installation. Under the direction of Dick Bozarth the final site preparations were made prior to the "E-Z bridge" installation. A D-8 dozer was placed on the receiving side of James Creek. Two redwood sill logs, approximately 20 feet long and 16-inch small end diameter, were installed (one on each side) for the E-Z bridge to rest on.

The first half of the E-Z bridge was placed on a roll log by an FR-745 front-end loader and the second D-8 dozer. The winch line from the D-8 dozer on the receiving side of James Creek was secured to the nearest end of the bridge while the other D-8 dozer raised the end of the E-Z bridge closest to its location.

While the dozer on the far side of James Creek winched the bridge across the creek, the other dozer kept the line taut suspending the bridge half across James Creek. See illustration.



Once the first half of the bridge was across James Creek the front-end loader was used for its final placement on the sill logs. The above process was then repeated for the second half of the bridge. After the second half was in place, logs were placed at both ends of the bridge and covered with dirt to bring the approaches up to the grade of the bridge's surface. With this final step completed, the bridge was ready for its first truckload of logs just twelve hours after installation preparations began.

The bridge was used for a total of 73 days. Approximately 2 million board feet of timber were hauled across the bridge.

1/ Timber Sale Officer on Jackson Demonstration State Forest, Fort Bragg, CA 95437.

Upon completion of log hauling, removal of the E-Z bridge was done with one D-7 dozer. The dozer raised the closest end of the bridge on a roll log. The bridge was winched across James Creek with the D-7's winch line tied onto the far side of the E-Z bridge. Both halves were flown completely across James Creek without touching the bottom of the creek.

The following costs, equipment and person hours apply to the installation and removal of the E-Z bridge:

E-Z Bridge (standard 30')	$21,210.00
Freight to Willits, CA, from Springfield, OR	1,000.00
Freight from Willits to James Creek	100.00
Unloading of bridge: 1/2 hour - loader	
1/2 hour - supervisor	

Bridge crossing preparation and installation:

12 hours	D-8 dozer with operator
6 hours	D-7 dozer with operator
6 hours	supervisor
6 hours	loader with operator
6 hours	choker setter

Bridge removal:

6 hours	D-7 dozer with operator
6 hours	supervisor
6 hours	loader with operator
6 hours	choker setter

Loading of bridge:

1 hour	loader with operator
1 hour	supervisor

This type of bridge installation presents several advantages over a permanent bridge or culvert. First, stream disturbance is minimal since there is no need for footings or fill material. Second, the cost is lower than for a permanent bridge or large culvert. Finally, the bridge's reusability makes it more versatile than a permanent structure and reduces management costs in the long run.

The "Hamilton E-Z Bridge is currently being stored at Parlin Fork Conservation Camp and will next be used for the Two Rock 1984 Timber Sale.

* * * * * * *

ATTENTION PLANT COLLECTORS!

In order to better understand the redwood ecosystem, a collection of the vascular flora of JDSF was recently begun by Roy Woodward, graduate student aide from UC-Davis. The collection will be housed at JDSF headquarters and is to consist of the trees, shrubs, and herbs found in the many plant communities of the redwood region. At present the collection contains more than 220 specimens, including 54 families, 124 genera, and 148 species. We hope this herbarium will be useful to investigators conducting vegetation surveys and regeneration studies. We encourage all JDSF researchers to contribute to and use this new resource.

* * * * * * *

Our sixth staff profile features Timber Sale Forester Jim "Hayseed" Hordyk. Jim grew up on a farm outside of Arlington, Washington, on the banks of the Stillaquamish River. He completed the first six years of his schooling in a two-room schoolhouse.

After high school, he went to work for two years at the Boeing Airplane Company, then joined the Navy. After two years overseas, he came back and enrolled at Washington State University where he earned a B. S. in Forestry in 1972. While in college, he worked two summers as a "back-country construction foreman," building campgrounds that no longer exist, around Spirit Lake on Mt. St. Helens. Later, he worked two summers as a "Forest Fire Crew Foreman" for the Washington Department of Natural Resources.

Following college Jim worked a year for a gyppo logging outfit, chasing logs under a 110-foot Skagit yarder tower. Then in 1974, he went to work for CDF as a Forestry Aide at the Davis Nursery, where his main duties were in reforestation and tree improvement. From Davis, he went to Monterey as a graduate trainee, then to Bear Valley Fire Station as a Junior Forester. In 1977, he went on to be a dispatcher out of the San Benito/Monterey Ranger Unit Headquarters in King City.

Finally, Jim came to JDSF in May of 1978, where he has worked as a Timber Sale Forester ever since, getting his professional forester's license in 1979.

Jim and his wife, Mary, have two daughters, Candy, 16 and Shelley, 11. Jim is active in the Navy Reserve and in his spare time enjoys diving and fishing in the Pacific from his boat.

* * * * * *

TIMBER SALES

All three 1982 timber sale agreements were completed during 1983. In addition, the Railroad Gulch Silvicultural Demonstration (see Newsletter No. 11), sold in 1983 as a one-year sale, was completed. Total volume harvested from the four sales was 30.9 million board feet, returning revenues to the state of $4.7 million. Class I sales (primarily firewood cutting permits) yielded another $20 thousand.

* * * * * *